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AUTHOR Weinberg, M. Katherine; And Others
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ABSTRACT

The purpose of this study was to empirically corroborate the hypothesis of Campos and Izard that the organized quality of infant emotion functions as a predominant means of communication during infancy. The study was designed to determine whether 6-month-old infants' facial expressions of emotion "systematically co-occur" with specific behaviors to form coherent affective action configurations. Participants were 50 mother-infant dyads who were videotaped during face-to-face interactions. Infants' facial expressions of emotion were coded using Izard's AFFEX system. Infants' behavior was coded for social engagement, object engagement, signals and solicitations, distress behaviors, and self-comforting. Four affective action configurations were identified. Each was characterized by particular behaviors in association with a particular facial expression. Configurations were coherently organized and significantly different from each other. These results support Campos and Izard's hypothesis. It is suggested that the affective action configurations convey different messages regarding the infants' emotional states and engagement with people and objects. Furthermore, it is suggested that the use of traditional emotional terms to label these affective action configurations may be misleading and limiting. (Author/RH)

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FACIAL EXPRESSIONS OF EMOTION AND SOCIAL AND OBJECT ORIENTED BEHAVIOR ARE SPECIFICALLY RELATED IN 6-MONTH-OLD INFANTS.

M. Katherine Weinberg
Andrew F. Gianino
Edward Z. Tronick

University of Massachusetts
Department of Psychology
Amherst, MA. 01003

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ABSTRACT

Campos and Izard stress the organized quality of infant emotions and hypothesize that the expression of emotion functions as a predominant means of communication during infancy. The purpose of this study was to empirically corroborate these hypotheses by evaluating if 6-month-old infants' facial expressions of emotion systematically co-occur with specific behaviors to form coherent affective action configurations.

Fifty mother-infant dyads were videotaped during face-to-face interactions. The infants' facial expressions of emotion were coded using Izard's AFFEX system. The infants' behavior was coded for social engagement, object engagement, signals/solicitations, distress behaviors, and self-comforting.

Four affective action configurations were identified. Each was characterized by particular behaviors in association with a particular facial expression. The configurations were coherently organized and significantly different from each other. It is suggested that these affective action configurations convey different messages regarding the infants' emotional states and their engagement with people and objects. Furthermore, it is suggested that the use of traditional emotional terms to label these affective action configurations may be misleading and limiting.

PURPOSE

Campos (Campos, Barrett, Lamb, Goldsmith, & Stenberg, 1983) and Izard (1977) stress the organized quality of infant emotions and hypothesize that the expression of emotion functions as a predominant means of communication during infancy.

Previous research suggests that infants are well equipped to express their emotional states. Infants display a variety of facial expressions, or components of facial expressions, including those of joy, interest, sadness, and anger (Hamilton, 1988; Izard, 1978; Izard, Huebner, Risser, McGinnes, & Dougherty, 1980). Most researchers, however, have focused on the young infant's facial expressions of emotion. Few have examined behaviors such as gaze, vocalizations, and gestures that may also be part of the expression of emotion. As a consequence, very little information is available on the relations among facial expressions and other expressive systems.

The purpose of this study is to evaluate whether or not 6-month-old infants' facial expressions of emotion systematically co-occur with vocalizations, gestures, gaze, self-comforting, and distress behaviors to form coherent affective action configurations. The demonstration that infants' expressive systems form coherent affective action configurations would lend strong support to the hypothesis that emotional expressions are organized and serve a communicative function.

METHOD

Subjects and Procedure

Fifty mothers and their 6-month-old infants were videotaped during a 2-minute normal face-to-face interaction, a 2-minute episode during which the mothers remained still-faced and unresponsive, and a 2-minute reunion episode of normal face-to-face interaction. The normal face-to-face interactions and the still-face are known to elicit a wide variety of infant facial expressions, gestures, vocalizations, and gaze patterns (Tronick, Adamson, Wise, Als, & Brazelton, 1975). Differences in the infants' reactions to these conditions are not reported here.

Coding

The infants' facial expressions and behaviors were coded separately by different coders on a second-by-second time base. Facial expressions were coded using Izard's AFFEX system. Behaviors were coded using the Infant Regulatory Scoring System (IRSS). The coding generated 18,000 seconds of data in which the infants' facial expressions, direction of gaze, gestures, vocalizations, self-comforting, and distress behaviors were available for analysis for their likelihood of co-occurrence.

RESULTS

1. Frequency of Facial Expressions and Behaviors

The facial expressions of joy, interest, sadness, and anger were the only expressions observed for a substantial amount of the time. Among these expressions, interest was by far the most predominant. The facial expressions of surprise, fear, disgust, and contempt occurred infrequently, and the facial expressions of distress, and shame/guilt/shyness were not observed.

TABLE 1 presents the proportion of time the infants displayed the AFFEX-coded facial expressions across conditions and regardless of behavior.

TABLE 2 presents the IRSS-coded behaviors and the proportion of time these behaviors occurred across conditions and regardless of facial expression.

TABLE 1

Observed Frequency and Proportion of Time the Infants Displayed Each AFFEX-Coded Facial Expression Across Conditions.

Facial Expression	Observed Frequency	Proportion
Joy	3772	.210
Interest	10968	.609
Sadness	394	.022
Anger	1041	.058
Surprise	15	.001
Fear	2	.000
Disgust	3	.000
Distress	0	.000
Contempt	5	.000
Shame/Guilt/Shyness	0	.000
Blend Negative	257	.014
Blend Positive	16	.001
Non-Codable	104	.006
Obscure	1423	.079

Note: AFFEX codes are mutually exclusive.

TABLE 2

Observed Frequency and Proportion of Time the Infants Displayed Each IRSS-Coded Behavior Across the Facial Expressions of Joy, Interest, Sadness, and Anger, and Across Conditions.

Behavior	Observed Frequency	Proportion
Look at Mother*	6561	.406
Look at Objects	6265	.387
Scans*,**	3349	.207
Signals/Solicitations	6470	.400
Neutral/Positive Vocalization	1831	.113
Fussy Vocalization	1046	.065
Crying	339	.021
Pick-Me-Up Gesture	366	.023
Other Gestural Signals	2888	.178
Oral Behavior/Self-Comforting	1233	.076
Sucking/Mouthing Body Part	539	.033
Sucking/Mouthing Object	694	.043
Escape/Get Away	328	.020
Distress Indicators**	480	.030
Inhibition/Freezing	0	.000

*The categories of Look at Mother, Look At Objects, and Scans are mutually exclusive. The other behavioral categories can co-occur with Look at Mother, Look At Objects, and Scans, and with each other.
** The category of Scans include brief glances at the mother, at objects, and around the laboratory. The category of Distress Indicators include behaviors such as spitting up, hiccuping, and heavy breathing.

2. The Relation between Facial Expressions and Behavior

To evaluate the relation between facial expressions and behavior, the observed frequency of each behavior as it co-occurred with the facial expressions of joy, interest, sadness, and anger was compared to their expected frequency of co-occurrence. Significant differences between observed and expected frequencies were evaluated using Chi-Square tests. The analyses revealed that the facial expression/ behavior combinations were significantly enhanced or inhibited as compared to their expected frequency of co-occurrence (See TABLE 3).

TABLE 3

Expected and Observed Frequencies for the Co-Occurrance of Facial Expressions and Behavior

	Joy		Interest		Sadness		Anger	
Behavior	**Exp.**	**Obs.**	**Exp.**	**Obs.**	**Exp.**	**Obs.**	**Exp.**	**Obs.**
Look at Mother	1530	<2938*	4449	>3062*	160	<184 NS	422	>377 NS
Look at Objects	1461	>479*	4248	<5500*	153	>97*	403	>189*
Scans	781	>355*	2271	<2406*	82	<113*	216	<475*
Pos. Voc.	427	<1125*	1242	>666*	45	>14*	118	>26*
Fussy Voc.	244	>137*	709	>354*	26	<177*	67	<378*
Crying	79	>19*	230	>87*	22	>11 NS	22	<222*
Pick-me-up	85	<92 NS	248	>172*	9	<13 NS	24	<89*
Other Gestures	674	<1067*	1958	>1419*	70	<129*	186	<273*
Mouthing Body Part	126	<155*	386	>371 NS	13	>5 NS	35	>8*
Mouthing Object	162	>53*	471	<633*	17	>3*	45	>5*
Escape/Get Away	77	>32*	222	>128*	8	>13 NS	21	<133*
Distress	112	<126 NS	326	<334 NS	12	>7 NS	31	>13*

* P< .01 NS = Nonsignificant

	Value	D.F.	Prob.
Overall Chi-Square	8825.406	33	.0000

3. Behaviors that Most Differentiated Among Facial Expressions

To determine which behaviors were most likely to differentially co-occur with a particular facial expression, a Logistic Regression Analysis was carried out. This analysis generates the following type of probabilistic statement: Behaviors X and Y, in combination, are P times more/less likely to co-occur with facial expression A than with facial expressions B, C, or D. It should be noted that these statements do not imply causality. Rather, they indicate the relative likelihood of the different facial expression/behavior combinations.

TABLE 4 presents the behaviors that were the most likely to co-occur with the facial expressions of joy, interest, sadness, and anger.

TABLE 4

Results from the Logistic Regression Analysis Indicating the Relative Likelihood of the Facial Expression/Behavior Combinations.

Behavioral Combination is X Times More (+) or Less (-) Likely to Co-Occur with:	Joy	Interest	Sadness	Anger
Look at Mother/ Positive Vocalizations	**+32X**	-11X	-3X	-8X
Look at Mother/ Other Gestural Signals	**+10X**	0	0	0
Look at Mother/ Mouthing Body Part	**+5X**	-2X	0	0
Look At Objects/ Mouthing Objects	-7X	**+6X**	0	0
Scans/ No Vocalizations	0	-10X	**+10X**	+5X
Scans/ No Vocalizations	0	-50X	+4X	**+53X**

Example: The behavioral combination of **Look at Mother/Positive Vocalizations** is **32** times more likely to co-occur with the facial expression of Joy than with the facial expressions of Interest, Sadness,and Anger.

CONCLUSION

Affective Action Configurations are Coherent Organizations of Face, Gesture, Voice, and Gaze.

The data clearly demonstrate that facial expressions and behaviors form coherent affective action configurations and that these configurations are different from one another. TABLE 5 presents the most likely and unlikely combinations of facial expressions and behaviors. These affective action configurations have simply been labelled Type 1, 2, 3, and 4 (SEE TABLE 5).

These results are a striking confirmation of Campos' and Izard's hypothesis of the organized quality of emotions and behavior in the young infant. The data suggest that emotional expressions, and presumably the underlying emotion, should not be perceived as disorganizing forces. Rather, emotions can be seen as functioning to guide and organize behavior, and affective action configurations as communicating a set of differentiated messages to the infant's caregivers.

TABLE 5

Likely and Unlikely Affective Action Configurations

TYPE	LIKELY CONFIGURATIONS	UNLIKELY CONFIGURATIONS
1	FACIAL EXPRESSION OF JOY LOOK AT MOTHER POSITIVE VOCALIZATIONS GESTURAL SIGNALS MOUTHING BODY PART	FACIAL EXPRESSION OF JOY LOOK AT OBJECTS SCANS FUSSY VOCALIZATIONS CRYING MOUTHING OBJECTS ESCAPE/GET AWAY
2	FACIAL EXPRESSION OF INTEREST LOOK AT OBJECTS SCANS MOUTHING OBJECTS	FACIAL EXPRESSION OF INTEREST LOOK AT MOTHER POSITIVE VOCALIZATIONS FUSSY VOCALIZATIONS CRYING GESTURAL SIGNALS PICK-ME-UP ESCAPE/GET AWAY
3	FACIAL EXPRESSION OF SADNESS SCANS FUSSY VOCALIZATIONS GESTURAL SIGNALS	FACIAL EXPRESSION OF SADNESS LOOK AT OBJECTS POSITIVE VOCALIZATIONS CRYING MOUTHING BODY PART MOUTHING OBJECTS
4	FACIAL EXPRESSION OF ANGER SCANS FUSSY VOCALIZATIONS CRYING PICK-ME-UP GESTURE GESTURAL SIGNALS ESCAPE/GET AWAY	FACIAL EXPRESSION OF ANGER LOOK AT OBJECTS POSITIVE VOCALIZATIONS MOUTHING BODY PART MOUTHING OBJECTS DISTRESS INDICATORS

Affective Action Configurations 1 and 2 Are Different For People and Objects and Convey Different Messages

Affective action configurations 1 and 2, which include the facial expressions of joy and interest and the behaviors that are associated with each, communicate the infant's intention to socialize with people and to act on objects. Furthermore, both configurations convey the infant's intention to continue these engagements through the sustained pattern of looking and the inhibition of negative vocalizations, distress, and escape behaviors. Importantly, the affective action configurations are different when the infant is attending to people and to objects. When the infant is looking at his/her mother, facial expressions of joy, positive vocalizations, mouthing body parts, and gestures are most likely to occur. By contrast, when the infant is looking at objects, he/she is most likely to display a facial expression of interest and to mouth objects while gestures and vocalizations are inhibited.

Affective Action Configurations 3 and 4 Communicate a Passive versus an Active Message

Affective action configuration 4, which is characterized by facial expressions of anger and other behaviors, communicates the infant's negative evaluation of an event through active vocal protests and attempts to get away and be picked-up. Affective action configuration 3, on the other hand, conveys a more passive state characterized by facial expressions of sadness, fussy vocalizations, and non-specific gestural signals. Importantly, crying, an active vocal protest, is an inhibited feature of this configuration.

Mouthing Serves a Different Function in Different Affective Action Configurations

Mouthing body parts or objects were expected to co-occur with the facial expressions of sadness and anger and to fulfill a self-comforting function. This was not found. Rather, mouthing body parts tended to occur with the facial expression of joy, and mouthing objects with the facial expression of interest. The data for joy and

mouthing body parts are similar to those reported by Brazelton, Koslowski and Main (1974) which suggest that infants employ self-comforting behaviors to modulate arousal during positive social interactions. With interest, mouthing objects may be more readily seen as a form of oral object exploration than an attempt at self-comforting. Interestingly, infants displaying sad or angry facial expressions occasionally also looked at objects. Tronick has suggested that looking at objects allows infants to regulate their negative affect. The finding that the infants looked at objects while simultaneously expressing facial expressions of sadness or anger suggests that diverting attention away from a distressing stimulus, such as the still-faced mother, to objects may have been a form of self-comforting or coping employed by the infants in this study.

Traditional Emotional Labels May Be Limiting

Typically we label affective action configurations simply by the facial expression presumed to index a particular emotion. This practice may be inadequate and possibly misleading. It makes the facial expression and the presumed underlying emotional experience the criterion events and disregards that the infant's behavior is organized in a particular manner in association with a particular facial expression. Neutral labelling (e,g, Type 1, 2, 3, and 4) emphasizes that the infant displaying a particular facial expression (e.g., anger) is at the same time acting on the world in a particular fashion (e.g., signaling to be picked-up while crying). It may be extreme to use neutral labels, but Kagan (1984) suggests that a benefit of this labelling is that it frees us up to empirically find affective action configurations unconstrained by a prespecified set of facial expressions or emotional terms. Furthermore, neutral labelling encourages us to search for the incentive, contextual, and infant state conditions that accompany these configurations. Eventually, this will allow us to expand our definitions and terminology based on empirical evidence.

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